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Secondary school classrooms daylighting evaluation in Negeri Sembilan, Malaysia

R N Syaheeza¹, E M Husini¹, F Arabi¹, W N W Ismail^{1,2} and M Z Kandar³

¹)Architecture Department, Faculty of Engineering and Built Environment, Universiti Sains Islam Malaysia, Nilai, 71800, Negeri Sembilan

²)Center of Architecture and Built Environment Innovative (SeRAMBI), Programme Architecture, Secretariat of Identity of National Architecture, Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia

³) Architecture Department, Faculty of Built and Environment, Universiti Teknologi Malaysia, Skudai, Johor

E-mail: rajanursyaheeza@gmail.com

Abstract. Natural daylight is a renewable energy source that is important in photobiology study which looks into the effect of light to living organism. Students' visual comfort satisfaction due to efficient daylight in a classroom are highlighted in the physical of the building and learning space such as windows and openings. One of the factor that influences the design of classrooms environmental condition. Environmental condition consideration includes the daylighting requirement for classrooms. Various standards and guidelines on daylighting consideration have been developed in Malaysia including the recommendation on Window-to-Floor Ratio (WFR) and illuminance level. However, the recommended WFR may not achieve the recommended illuminance level. This paper evaluates whether the recommended WFR design achieve the recommended acceptable illuminance level. Two classrooms in Kolej Permata Insan, Nilai, Negeri Sembilan with different orientation were selected for the study. Integrated Environmental Solution (IESVE) simulation software is used for daylight evaluation. The WFR of the two selected classrooms were set to the recommended 20%. Simulation results shows that the illuminance level for both classrooms are higher than recommended. The simulation also shows that the daylight distribution in the classrooms are not uniform, thus creating inefficient daylight condition. Therefore, the WFR recommends further studies with additional of daylighting design strategy considerations.

1. Introduction

Learning spaces design has evolved throughout the years due to various reasons such as construction technology, educational systems, government's policies, space requirement and environment condition. Throughout the classroom design development, a concept of 'open-air design' was popularized. This concept shifted the focus of classroom design towards daylighting considerations because the concept allows too much daylight amount in the classroom that causes visual discomfort to the students [1]. Various research proven that sufficient daylight in a classroom is required due to its positive effect towards the students including improvements on learning performance, alertness, cognitive skills, behavior, mood, circadian rhythm, dental strength and productivity [2, 3, 4]. Thus, various standards and guidelines were introduced all around the world.



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